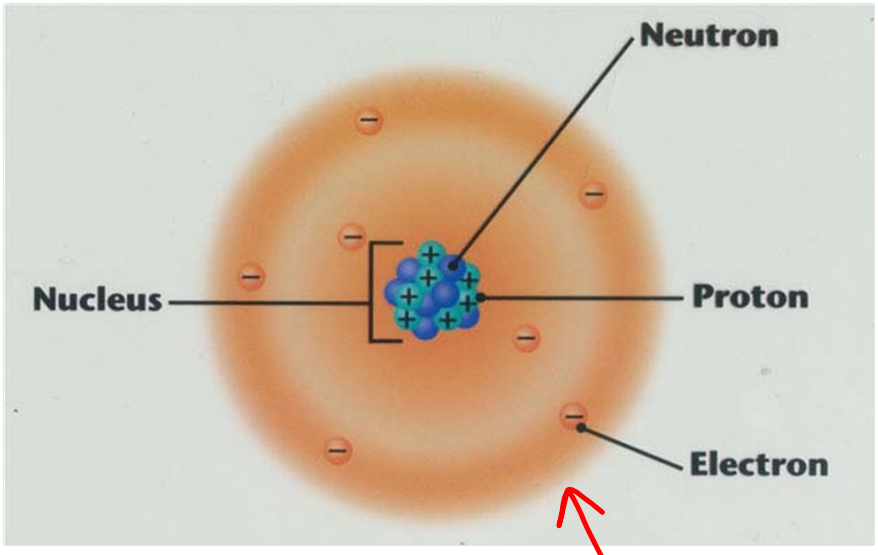
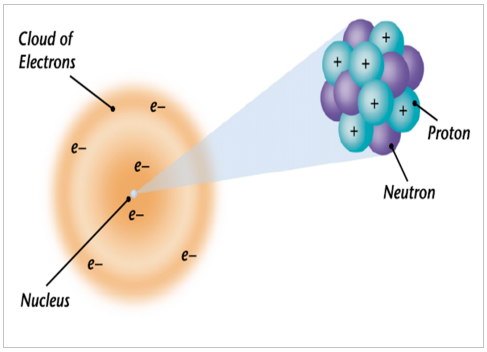
# The Atom

- The smallest part of an element that retains the element's properties
- Basic building blocks of matter
- 3 parts to an atom:
  - Proton
  - Neutron
  - Electron




Electron cloud



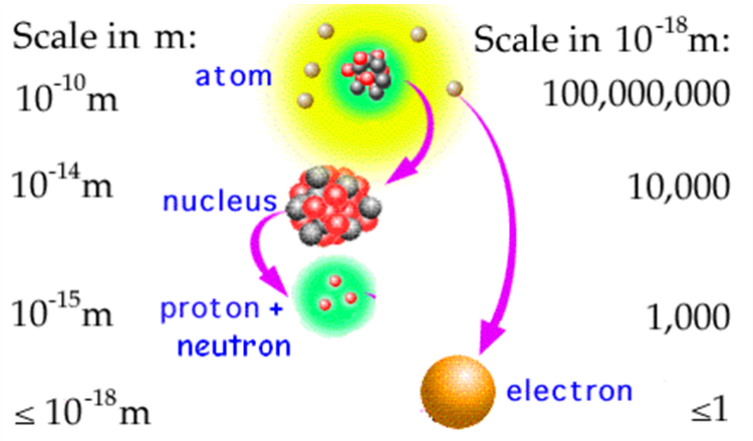

- Nucleus
  - Positively charged
  - Protons and Neutrons
    - Protons → positively charged
    - Neutrons → no charge
  - Quarks make up both protons and neutrons

- Electrons
  - Negatively charged
  - Occupy the electron cloud, which surrounds the nucleus
    - Arranged into "shells" or "orbitals"
    - Electrons do NOT move in perfect orbitals → movement is actually unpredictable
  - Cloud gives approximate location of electrons

| | Location | Charge | Mass | Special Fact |
|---|---|---|---|---|
| Protons | Nucleus | Positive (+) each proton = +1 | 1 amu<br>Same as neutron | Number of protons determines the identity of the element |
| Neutrons | Nucleus | Neutral | 1 amu<br>Same as proton | |
| Electrons | Electron Cloud | Negative (-) each electron = -1 | 0.00054 amu<br>(1/2000th mass of a proton or neutron) | Electron cloud takes up 99.9999999% of the volume of the atom |

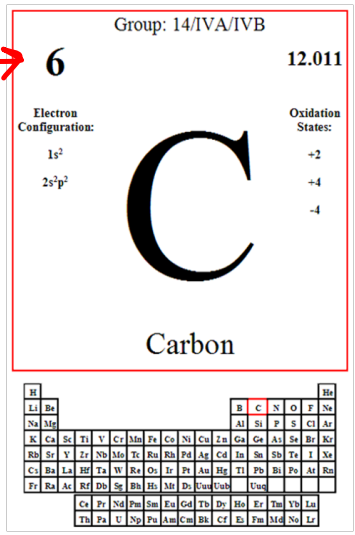
amu = atomic mass unit

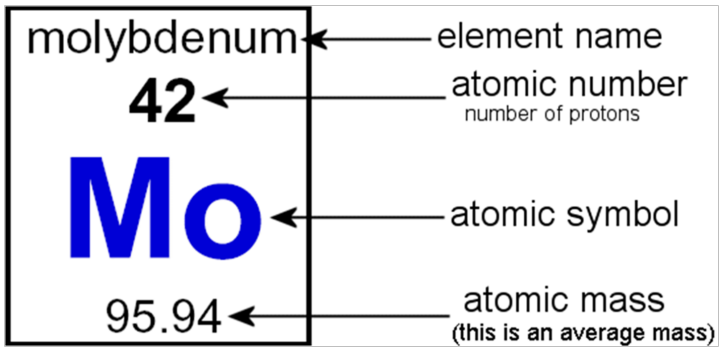
charge = protons + electrons

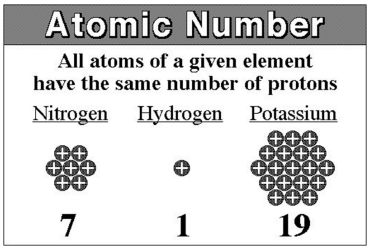


. Properties of Atoms:

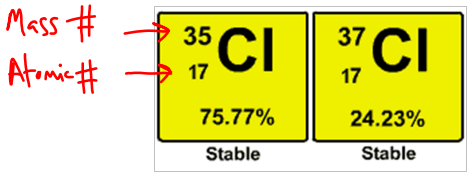
- Atomic Number → # Protons






- Each element has its own specific atomic number
- It is really difficult to change atomic numbers
- In a NEUTRAL atom, this is also the number of electrons (atomic #)




- Mass Number
  - Mass of a specific ISOTOPE of an atom (same element, different number of neutrons)
  - Sum of protons and neutrons

# neutrons in $^{35}_{17}Cl$

$= 35 - 17 = 18$

# neutrons in $^{37}_{17}Cl$

$= 37 - 17 = 20$

- (Average) Atomic Mass:

average mass $= (35)(.7577) + (37)(.2423)$

$= 26.5195 + 8.9651$

$= 35.485$

# on the periodic table